4:15

769-2 Intraoperative Echocardiography in the Ross Procedure

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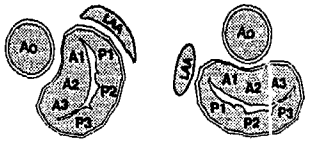
The Ross procedure (ROSS), which provides a low postop gradient and no need for anticoagulation, involves replacing the aortic (Ao) valve with a pulmonary autograft, reimplanting the coronaries, and replacing the pulmonic valve with a homograft. To determine the usefulness of intraoperative echo (IOE) in assessing ROSS, we studied 58 pts, mean age 39.6 yrs, 15 (28%) women; with stenosis (20 pts), regurgitation (AR) (22 pts), or combined (16 pts). Ao and pulmonic annular diameters were measured by prepump IOE. *Results:* The postpump TEE found problems in 7 pts (12%) requiring 2nd pump runs for persistant AR in 4, myocardial ischemia in 2, and pulmonic regurgitation in 1 pt. The final postpump IOE showed trace or no AR in 47 pts ("echo perfect" group), vs mild (1+) or more AR in 11 pts ("PostIoeAR" group). Followup echo (11 ± 20 weeks postop in 91% of pts), found 2+ or more AR in 5 (50%) of 10 in the PostIoeAR group vs 1 (2%) of 43 with "echo perfect" postpump IOE ($p < 0.0001$). Prepump mismatch (> 3 mm) in Ao vs. pulmonic diameters was more common in the PostIoeAR group and involved 3 of 6 with 2+ or more AR by followup echo. *Conclusions:* IOE assists in ROSS by 1) Preop sizing of Ao and pulmonic annulus 2) Detecting unsuccessful surgery (12%) for immediate revision of Ross. 3) Suboptimal outcome with 2+ or more AR on followup echo is infrequent (10%) and was predicted in 5 out of 6 cases by 1+ or more AR by IOE TEE immediately after ROSS.

4:30

769-3 A Systematic Strategy to Accurately Localize Mitral Defects Using Multiplane Transesophageal Echocardiography: A Comparison With Surgical Findings

Gary P. Foster, Eric M. Isselbacher, Geoffrey A. Rose, Cary Akins, David Torchiana, Michael H. Picard. *Mass. Gen. Hosp., Boston, MA*

Echocardiographic and intraoperative surgical views of the mitral valve (MV) differ significantly in orientation, presenting difficulties when repair requires accurate localization of MV defects. We therefore devised and tested a new TEE strategy to systematically map the MV. Consecutive intraoperative TEE studies of 32 patients with MV defects [24 native (N) with prolapse or flail, 8 prosthetic (P) with paravalvular leaks] were evaluated using a schematic in which the mitral valve was divided into six segments (N: 3 anterior, 3 posterior; P: six circumferential sections). Each segment was identified using specific angles, degrees of flexion, rotation, and relation to internal landmarks. The findings were plotted (reference) and then transposed to a schematic of the surgical perspective. All MV defects were independently localized by TEE preoperatively and then compared with surgical findings. *Results:* There was excellent agreement between the TEE and surgical findings in segmentally localizing defects in the N group (136/144 segments, $p < 0.001$) and good agreement in the P group (40/48, $p < 0.001$). In 12/16 discrepancies, TEE and surgery localized a given defect to adjacent segments.



By accurately localizing MV defects, this systematic TEE strategy has the potential to improve the preoperative assessment of patients with regurgitant MV lesions.

4:45

769-4 Transesophageal Echocardiographic Monitoring of the Endoaortic Occlusion Clamp: Preclinical and Clinical Studies

Frederick G. St. Goar, Lawrence C. Siegel, William Peters, John H. Stevens, Thomas A. Burdon, Steven Howard, Mario Pompili, Bruce A. Reitz. *Dept Cardiothoracic Surgery, Stanford CA*

Port-access closed-chest CABG is a revolutionary development in cardiac surgery. To accomplish the minimally invasive procedure controlled cardiac arrest is performed with a catheter-based endovascular aortic occlusion clamp (EAC) (Heartport, Redwood City, CA) placed in the mid ascending aorta. This study reports on TEE monitoring of the EAC. The human EAC is a 10.5 Fr triple-lumen catheter with an elastomeric ballon proximal to the soft distal tip. The catheter, introduced via the femoral artery, is pre-formed to the shape of the aortic arch to ease placement under fluoroscopic guidance. The balloon is inflated to occlude the aorta and the central lumen subsequently used for delivery of cardioplegia or root venting. Initial catheter positioning is facilitated with TEE by visualizing the distal tip in the aortic root using the vertical plane and then pulling back until just out of view. Monitoring for distal catheter migration during the procedure is accomplished by continuous TEE root scanning. Proximal migration is determined by simultaneous Doppler monitoring of right carotid arterial flow. This monitoring system was initially tested in 4 canine and 2 cadaveric studies and then successfully used in the first 3 human port-access CABG cases. The EAC was easily visualized with TEE in all procedures. No significant EAC migration occured in the canine studies. The human TEE EAC appearence was confirmed in the cadaver studies. In 2 human cases minimal distal migration was noted without hemodynamic consequence and in 1 human case proximal migration was determined by abnormal carotid flow and corrected under TEE guidance without fluoroscopy. *Conclusion:* Combined TEE and carotid Doppler ultrasound provide effective monitoring of EAC position during closed-chest cardiac surgery.

5:00

769-5 Utility of 3-D Echocardiography in Patient Selection and Guidance for Atrial Septal Defect (ASD) Closure by the New Das-Angel Wings Occluder Device

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Clear assessment of the site and size of ASDs, and of tissue surrounding the defect, are critical in selecting pts for placement of the new Das-Angel Wings occluder device (DAWOD). This device has 2 square surfaces attached in the middle by a conjoint ring. Optimal placement requires that all 4 corners are in opposition with the septum on either side. While TTE and TEE are of value, they do not, unlike, 3DE, provide en-face views of all 4 corners of the device in one view. We applied 3DE in 20 pts in whom DAWOD was contemplated based on 2D TEE images. In 17 secundum ASD pts, 3DE displayed the site, shape, dynamic changes in size and the maximum diameter (maxD) of the defect in en-face views. Because of a small size and shunt shown by 2DE and 3DE, 2 were excluded. 3DE demonstration of a defect too large (> 20 mm in maxD) and/or insuffient rim (< 5 mm) excluded 4 other pts. In 3 PFO pts, 3DE displayed the PFO and the surrounding tissue. 11 underwent the procedure. Rapid reconstruction 3DEs were obtained before, during and after DAWOD placement. For appropriate sizing of the device, 3DE maxD was relied on. In 8 pts with successful device placement, 3DE simultaneously displayed all 4 corners of the device on the right and left septal en face views. In 3 pts with residual shunts, 3DE displayed only 3 corners in the optimal position, with the fourth protruding to the opposite side in 1 pt, and inadequate opening of one corner of the device in other 2 pts. Thus, our initial experience indicates the potential value of 3DE in pt selection and in guiding optimal placement of DAWOD.

5:15

769-6 Transesophageal Echocardiographic Color Doppler Findings in Traumatic Aortic Rupture and Aortic Dissection

Philippe Vignon, Philippe Lagrange, Daniel Krauss, Beth Balasia, Roberto Lang. *Univ. of Limoges, France; Univ. of Chicago, IL*

The differential diagnosis between traumatic aortic rupture (TAR) and acute aortic dissection (AAD) using TEE is not well described. To determine whether color Doppler provides additional information to distinguish between these two acute aortic conditions, we reviewed TEE studies performed in 67 patients suffering from either AAD (n = 57; 30 type A, 27 type B) or traumatic rupture of the aortic isthmus (n = 10). All TEE diagnoses were confirmed at surgery (n = 35), necropsy (n = 6), or by an alternative imaging modality (aortography, MRI, or computed tomography). The following color Doppler findings were evaluated: (i) blood flow velocities on both sides of intraluminal flaps; (ii) presence of a mosaic of colors reflecting blood flow turbulence; and (iii) detection of entry tears. In all but one case of AAD, blood flow velocities appeared slower in the false lumen at the aortic isthmus level, while in all cases of TAR similar velocities were uniformly observed on both sides of the medial flaps. Whereas the presence of a mosaic of colors was always noted surrounding the disrupted aortic wall of TAR, this finding was seen in only one case of AAD at the aortic isthmus level. Entry tears were demonstrated by color flow mapping in 46% of AAD (ascending aorta:n = 16; descending

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